CLAIMS

THE FOLLOWING IS CLAIMED:

1. A process for low-damage anisotropic dry etching of a substrate, comprising the steps of:

placing a substrate on a mechanical support within a plasma reactor, said mechanical support isolated from the creation of the plasma; and

subjecting the substrate to a plasma including low energy electrons having a kinetic energy less than about 100 eV and at least one species reactive with the substrate.

2. The process of Claim 1, further comprising the step of selecting said substrate from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating substrates.

3. The process of Claim 1, wherein said plasma reactor generates a dc plasma.

4. The process of Claim 1, wherein said plasma reactor generates an ac plasma.

5. The process of Claim 1, wherein said mechanical support is electrically biased, said mechanical support imparting said electrical bias upon the substrate.

6. The process of Claim 5, wherein said mechanical support imparts a dc electrical bias upon the substrate .

7. The process of Claim 5, wherein said mechanical support imparts an ac bias upon the substrate.

8. The process of Claim 5, wherein said mechanical support imparts both a dc and an ac bias upon the substrate.

9. The process of Claim 5, further comprising the step of periodically modulating said electrical bias of said mechanical support to a value below that of a value of the plasma.

10. The process of Claim 1, further comprising the step of including an additional structure within said plasma, said additional structure capable of being electrically biased.

11. The process of Claim 10, wherein said additional structure is dc electrically biased.

12. The process of Claim 10, wherein said additional structure is ac electrically biased.

13. The process of Claim 10, wherein said additional structure is both ac and dc electrically biased.

14. A process for low-damage anisotropic dry etching of a substrate, comprising the steps of:

providing a direct current plasma reactor including a cathode and an anode;

placing a semiconductor on the anode of the direct current plasma reactor;

generating low energy electrons with a cold cathode;

subjecting the semiconductor to a plasma including low energy electrons and a species reactive with the semiconductor; and

placing an additional structure within said plasma, said additional structure capable of being electrically biased.

15. The process of Claim 14, further comprising the step of selecting said substrate from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating substrates.

16. The process of Claim 14, wherein said additional structure is dc electrically biased.

17. The process of Claim 14, wherein said additional structure is ac electrically biased.

18. The process of Claim 14, wherein said additional structure is both ac and dc electrically biased.

19. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:

a plasma reactor; and

a mechanical support within said plasma reactor, said mechanical support isolated from the creation of the plasma.

20. The apparatus of Claim 19, wherein said substrate is selected from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating substrates.

21. The apparatus of Claim 19, wherein said plasma reactor generates a dc plasma.

22. The apparatus of Claim 19, wherein said plasma reactor generates an ac plasma.

23. The apparatus of Claim 19, wherein said mechanical support is electrically biased, said mechanical support imparting said electrical bias upon the substrate.

24. The apparatus of Claim 23, wherein said mechanical support imparts a dc electrical bias upon the substrate .

25. The apparatus of Claim 23, wherein said mechanical support imparts an ac bias upon the substrate.

26. The apparatus of Claim 23, wherein said mechanical support imparts both a dc and an ac bias upon the substrate.

27. The apparatus of Claim 19, further comprising an additional structure within said plasma, said additional structure capable of being electrically biased.

28. The apparatus of Claim 27, wherein said additional structure is dc electrically biased.

29. The apparatus of Claim 27 , wherein said additional structure is ac electrically biased.

30. The apparatus of Claim 27, wherein said additional structure is both ac and dc electrically biased.

31. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:
a direct current plasma reactor including a cathode and an anode;
a semiconductor placed on the anode of the direct current plasma reactor;
means for generating low energy electrons with a cold cathode;

means for subjecting the semiconductor to a plasma including low energy electrons and a species reactive with the semiconductor; and

an additional structure within said plasma, said additional structure capable of being electrically biased.

32. The apparatus of Claim 31, wherein said substrate from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating substrates.

33. The apparatus of Claim 32, wherein said additional structure is dc electrically biased.

34. The apparatus of Claim 32, wherein said additional structure is ac electrically biased.

35. The apparatus of Claim 32, wherein said additional structure is both ac and dc electrically biased.